PHYSICS MDCAT

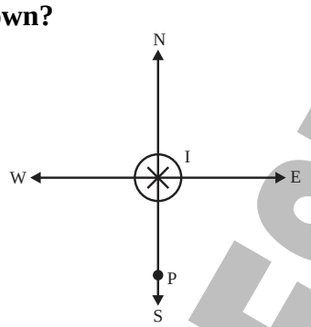
Electromagnetism

TEST#05 (UNIT # 09)

Q.86 A current carrying power line carries electronic current from south to north. What will be the direction of the magnetic field at a point above the wire?

A) East to west
C) West to east
B) North to south
D) South to north

Q.87 A vertical wire carries an electronic current into the page. What is the direction of magnetic field at point P located as shown?



A) West
C) North
B) East
D) South

Q.88 Two straight horizontal parallel wires are carrying the same current in the same direction, "d" is the distance between the wires. You are given a small magnetic needle. At which of the following positions will the orientation of the needle be independent of the magnitude of the current in the wires:

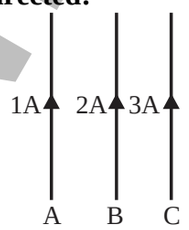
A) At a distance $\frac{d}{2}$ from any of the wire

B) At a distance $\frac{d}{2}$ from any of the wire in horizontal plane only

C) Anywhere on the circumference of a vertical circle of radius d

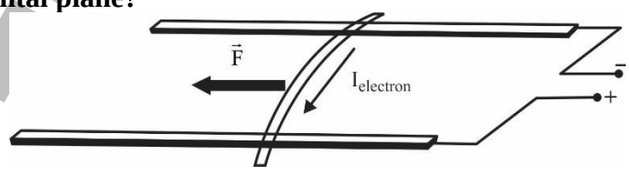
D) At points half way between the wires in the horizontal plane

Q.89 Three infinite straight wires equidistant from each other carrying currents (wire A & C carrying conventional current while wire B carrying electronic current) as shown in figure. The resultant force on wire B is directed:



A) Towards A
C) Zero
B) Towards C
D) Perpendicular to plane of page

Q.90 What should be the direction of magnetic field applied to have the direction of magnetic force as shown in figure, where an electronic current flow through the wire and circuit is placed in horizontal plane?



A) Vertically upwards
C) Rightwards
B) Vertically downwards
D) Leftwards

Q.91 A 1.0 m wire, stretched horizontally, carries a current of 20 A from west to east in a magnetic field of 0.2 T directed vertically upwards. The magnitude and direction of the force on the wire is:

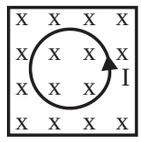
A) 2 N, towards south
B) 2 N, towards north
C) 4 N, towards south
D) 4 N, towards north

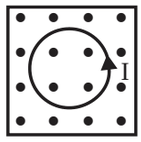
Q.92 A very long solenoid has 400 turns per meter length of the solenoid. A current of 1.6 A flows through it. Then the magnetic induction at the middle point of the solenoid on its axis, is approximately:
A) 16×10^{-4} T
B) 32×10^{-4} T
C) 8×10^{-4} T
D) 4×10^{-4} T

Q.93 A long, straight wire is carrying a current of 4 A. The magnetic field at a point distant 5 cm from the wire is:
A) 16×10^{-2} gauss
B) $4\pi\times10^{-6}$ gauss
C) 16×10^{-7} gauss
D) 4×10^{-2} gauss

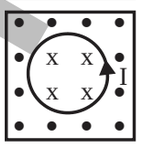
Q.94 You are asked to design a solenoid that will give a magnetic field of 1.0 T, yet the current must not exceed 20 A. The number of turns per unit length of that solenoid will be:
A) 3.9×10^{4}
B) 9.1×10^{3}
C) 8.5×10^{3}
D) 1.25×10^{6}

Q.95 What happens to the magnetic field produced by a solenoid if the number of turns of solenoid and its current are doubled, while its length is quadrupled?
A) Becomes twice
B) Becomes quadrupled
C) Becomes 8 times
D) Remains same

Q.96 Which of the following diagrams represent the magnetic field due to a circular current?
A) 

B) 

C) 

D) 

Q.97 A solenoid 15 cm long has 300 turns and a current of 5 A flows through it. What is the magnetic field outside of solenoid?
A) 0.65×10^{-2} Wb m^{-2}
B) 1.3×10^{-2} Wb m^{-2}
C) 4.4×10^{-3} Wb m^{-2}
D) Zero

Q.98 An electron is moving along negative x-axis. To get it moving on an anti-clockwise circular path in x-y plane, a magnetic field is applied.
A) Along positive y-axis
B) Along negative y-axis
C) Along positive z-axis
D) Along negative z-axis

Q.99 An α-particle moves at right angles to a uniform magnetic field of 1.0 T with a speed of 10^{7} m s^{-1}. The force experienced by α-particle is:
A) 3.2×10^{-12} N
B) 3.2×10^{-11} N
C) 8×10^{-13} N
D) 8×10^{-11} N

Q.100 A proton enters a magnetic field of flux density 3.0 Wb m^{-2} with a velocity of 4×10^{7} m s^{-1} at an angle of 30° with the field. The force on the proton will be:
A) 2.4×10^{-12} N
B) 24×10^{-12} N
C) 9.6×10^{-12} N
D) 0.96×10^{-12} N

Q.101 A charged particle is moving in uniform magnetic field such that its velocity is perpendicular to field, then:
A) Its momentum changes but total energy remains same
B) Both momentum and total energy remains same
C) Both momentum and total energy changes
D) Total energy changes but momentum remains same

Q.102 The magnetic force on a conductor of length L, carrying total no. of charges "nAL", each charge of value "q" is given as:
A) $\vec{F}=q\left(\vec{v}\times\vec{B}\right)$
B) $\vec{F}=qLA\left(\vec{v}\times\vec{B}\right)$
C) $\vec{F}=qnAL\left(\vec{v}\times\vec{B}\right)$
D) $\vec{F}=nAq\left(\vec{L}\times\vec{B}\right)$

Q.103 A magnetic field:

A) Always exerts a force on a charged particle
B) Never exerts a force on a charged particle
C) Exerts a force, if the charged particle is moving across the magnetic field lines
D) Exerts a force, if the charged particle is moving along the magnetic field lines

Q.104 While finding the radius of circular path in the experiment to find e/m of electron, the glass tube is filled with:

A) H_2
C) He
B) O_2
D) CO_2

Q.105 An electron (mass = 9×10^{-31} kg, charge = 1.6×10^{-19} C) moving with a velocity of 10^6 m s^{-1} enters a region where magnetic field exists. If it describes a circle of radius 0.10 m, the magnetic field must be:

A) 1.8×10^{-4} T
C) 14.4×10^{-5} T
B) 5.6×10^{-5} T
D) 1.3×10^{-6} T

Q.106 A proton, a deuteron and an α-particle accelerated through the same potential difference enter a region of uniform magnetic field, moving at right angles to B. What is the ratio of their K.E?

A) 2:1:1
C) 2:2:1
B) 1:2:1
D) 1:1:2

Q.107 An α-particle and a proton having same momentum enter into the region of uniform, perpendicular magnetic field. The ratio of radii of curvature of their circular paths in the magnetic field is:

A) 1:1
C) 1:4
B) 1:2
D) 4:1

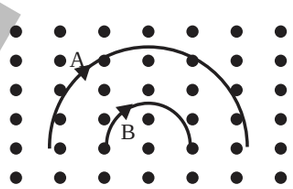
Q.108 Ions of different momenta (p), having different charge, enter normally to a uniform magnetic field. The radius of the orbit of an ion is proportional to:

A) $\frac{p}{q}$
C) $\frac{q}{p}$
B) $\frac{p^2}{q^2}$
D) $\frac{q^2}{p^2}$

Q.109 A proton, a deuteron and an α-particle, having the same kinetic energy, are moving in circular trajectories in a constant magnetic field. If r_p, r_d and r_α denote, respectively the radii of the trajectories of these particles, then:

A) $r_\alpha = r_p < r_d$
C) $r_\alpha = r_d > r_p$
B) $r_\alpha > r_d > r_p$
D) $r_p = r_d = r_\alpha$

Q.110 Two particles A and B of mass m_A and m_B respectively and having the same charges are moving in a plane. A uniform magnetic field exists perpendicular to this plane. The speed of the particles are v_A and v_B respectively and the trajectories are as shown in the figure. Then:



A) $m_A v_A < m_B v_B$
C) $m_A > m_A$ and $v_A = v_B$
B) $m_A v_A > m_B v_B$
D) $m_A = m_B$ and $v_A = v_B$

Q.111 Two parallel straight wires carrying current in same direction will:

A) Repel each other
C) Attract each other
B) No effect
D) May repel or attract

Q.112 One Tesla is equal to:

A) $N\,A^{-1}\,m^{-1}$
C) $A\,N\,m^{-1}$
B) $N^{-1}A\,m$
D) $N\,A^{-1}\,m$

Q.113 The magnetic force on an electron travelling with $10^8\ m\ s^{-1}$ perpendicular to a field of strength 1 $Wb\ m^{-2}$ is:

A) $1.6 \times 10^{-11}\ N$
C) $Zero$
B) $10^5\ N$
D) $10^{11}\ N$

Q.114 _____ is correct relation (T = tesla and G = gauss):

A) 1 T=10^4 G
C) 1 T=10^{-4} G
B) 1 T=10^{-2} G
D) 1 T=10^2 G

Q.115 The magnetic force is simply a:

A) Reflecting force
C) Deflecting force
B) Restoring force
D) Gravitational force